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Super Yangians, Affine Super Yangians and Quantum Loop Superalgebras

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First, we consider the relationship between super Yangians and quantum loop superalgebras. We consider structures of tensor categories on analogs of the category \mathfrak{D} for representations of the super Yangian $Y_{\hbar}(A(m, n))$ of the special linear Lie superalgebra and the quantum loop superalgebra $U_q(LA(m, n))$, explore the relationship between them. The construction of an isomorphism in the category of Hopf superalgebras between completions of the super Yangian and the quantum loop superalgebra endowed with the so-called “Drinfeld” comultiplications is described. A theorem on the equivalence of the tensor categories of modules of the super Yangian and the quantum loop superalgebra is formulated, which strengthens the previous result. We also describe the relationship between Quasi-Triangular structures and Abelian difference equations, which are determined by the Abelian parts of universal R -matrices. Second, we define an affine super Yangian $Y_{\epsilon_1, \epsilon_2}(\tilde{sl}(m, n))$ for an arbitrary system of simple roots Π of affine Kac-Moody superalgebra $\tilde{sl}(m, n)$. We introduce two type presentation of super Yangian, namely minimalistic and current presentation. We prove that this two presentations are equivalent. It is proved that the super Yangians of a quantum affine superalgebra $\tilde{sl}(m, n)$ defined by different simple root systems Π and Π_1 are isomorphic as associative superalgebras. Some of these results were obtained in articles: V. A. Stukopin, Relation between categories of representations of the super-Yangian of a special linear Lie superalgebra and quantum loop superalgebra, Theoret. and Math. Phys., 204:3 (2020), 1227–1243., V. A. Stukopin, Quasi-triangular structures on the super Yangian and quantum loop superalgebra and difference equations, Theoret. and Math. Phys., 2022 (to appear). We also describe cosuperalgebra structures on affine Super Yangian.

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